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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/871,887	06/01/2001	Robert Angelo Mercuri	P-1047/N-7343	2070

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EXAMINER
PIAZZA CORCORAN, GLADYS JOSEFINA

ART UNIT	PAPER NUMBER
1733	9

DATE MAILED: 05/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/871,887	MERCURI, ROBERT ANGELO	
	Examiner	Art Unit	
	Gladys J Piazza Corcoran	1733	

-- The MAILING DATE of this communication appears on the c ver sheet with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

FINAL ACTION

Claim Objections

1. Claims 15 and 16 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 15 and 16 recite that the first sheet comprises the protrusion and the second sheet comprises the recess, respectively. These limitations are already claimed in lines 3 and 5of claim 1.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dettling et al. (US Patent No. 4,732,637) in view of Chi (US Patent No. 4,416,955) and/or van Ommering et al. (US Patent No. 4,565,749).

Dettling discloses a method of manufacturing a bipolar graphite article (bipolar assembly 36) by forming a first component (distribution plate 18, 402) of graphite material with an operative side (with grooves) and a back side, forming a second component (distribution plate 20, 404) of graphite material with an operative side (with

grooves) and a back side, and assembling the components (column 7, lines 5-10, 64-68; column 8, lines 29-42).

Dettling discloses the importance of forming a tight seal between the two components (column 2, lines 20-25). It is well known in the bonding art to provide two plates with interlocking configurations in order to secure a tight seal or bond between the plates. For example, Chi discloses a method of securing the plates of a fuel cell together where an integral seal is formed between cooling plates by providing the plates with male and female joints as an alternative to other known methods (column 3, lines 43-47). Van Ommering discloses another example in the field of manufacturing fuel cells where it is known to provide corresponding tongue 43 and groove 41 elements on two components (frame segments 21 and 23) in order to provide a positive seal between the components (column 6, lines 29-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the components in the method of manufacturing a bipolar graphite article as shown in Dettling with a protrusion and a corresponding recess in order to form a better seal between the components as is well known in the bonding arts in general and as particularly known in the field of forming fuel cells as exemplified by Chi and/or van Ommering.

As to claim 8, Dettling discloses pressing the components together (column 7, lines 66-68).

4. Claims 2-7, 9-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dettling et al. in view of Chi and/or van Ommering et al. as applied to claims 1 and 8 above, and further in view of Mercuri '728 (5,885,728).

Dettling does not specifically disclose the method steps of forming the graphite components, only reciting that the plates are molded or extruded from graphite particles (column 8, lines 29-43). Mercuri '728 discloses known methods of forming graphite component plates for flow field plates in fuel cells. It would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture the bipolar graphite article as shown in Dettling, Chi and/or van Ommering by forming the graphite components by known methods in the art as shown by Mercuri '728 in order to provide graphite components with increased sealability, increased flexural strength, improved heat dispersion and lower voltage drop (column 3, lines 34-37; column 4, lines 46-51).

As to claims 2, 11 and 19, Mercuri '728 discloses that it is known to form the graphite material plates by embossing (mechanically deformed by stamping) a sheet of resin-impregnated graphite material (column 4, lines 54-62). As to claim 3, the sheet was uncured at the forming step (the sheet is dried prior to stamping, however curing does not take place until after the plate is stamped and heated to 235°C (column 4, line 54 to column 5, line 3). As to claim 4, the resin impregnated graphite material is cured (column 5, lines 1-3). As to claim 5, Mercuri '728 discloses compressing the resin impregnated graphite material (calendered, column 4, lines 9-16; stamping into shape, column 4, lines 54-63). As to claim 6, the resin impregnated graphite material is uncured at the forming step (the sheet is dried prior to stamping, however curing does not take place until after the plate is stamped and heated to 235°C (column 4, line 54 to column 5, line 3). As to claim 7, the resin impregnated graphite material is cured (column 5, lines 1-3). As to claim 9, Mercuri '728 discloses the graphite material is resin

impregnated and uncured at the step of forming and then curing occurs at a later heating step. Dettling discloses heating the graphite components during the pressing step to assemble the components together. It would have been obvious to one of ordinary skill in the art at the time of the invention to cure the components during the pressing step in order to reduce the number of manufacturing steps. Only the expected results would be attained. As to claim 11, Dettling discloses heating after assembling (hot pressing). As to claim 12, the components in Dettling are formed of flexible graphite sheets (as are conventional due to their relatively thin layers) and Mercuri '728 discloses forming flexible graphite sheets (column 3, lines 34-39). As to claim 13, Mercuri '728 discloses a resin content greater than 5% (15-20% resin see examples in column 4). Furthermore, the claimed ranges of resin are within the conventional ranges, and it would have been well within the purview of one of ordinary skill in the art to provide such ranges, only the expected results would be attained. As to claim 14, it would have been well within the purview of one of ordinary skill in the art to provide the plates with the same composition and content of resin, only the expected results would be attained. As to claims 15 and 16, as discussed above, it would have been obvious to provide a protrusion and a recess in the sheets as obvious over well known bonding techniques as exemplified by Chi and/or Van Ommering. As to claim 17, Mercuri '728 discloses the claimed density of the graphite sheet (see column 4, lines 16,40 to 45, 67 and column 5, line 1). Furthermore, the claimed density ranges are within the conventional ranges for graphite sheets and it would have been well within the purview of one of ordinary skill in the art to provide sheets with conventional densities, only the

expected results would be attained. As to claim 18, it would have been well within the purview of one of ordinary skill in the art to provide the plates with the same density, only the expected results would be attained. As to claim 19, Dettling discloses bonding the components after assembling (column 4, lines 15-25). As to claim 20, Dettling bonds the components by heating up the bipolar graphite article (column 4, lines 15-25).

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dettling et al. in view of Chi and/or van Ommering and Mercuri '728 as applied to the claims above, and further in view of Selover, Jr. et al. (US Patent No. 4,014,730).

As to claim 9, Mercuri '728 discloses the graphite material is resin impregnated and uncured at the step of forming and then curing occurs at a later heating step. Dettling discloses heating the graphite components during the pressing step to assemble the components together. It would have been obvious to one of ordinary skill in the art at the time of the invention to cure the components during the pressing step in order to reduce the number of manufacturing steps. Only the expected results would be attained. This is particularly true in view of Selover, which discloses it is known to bond two resin impregnated graphite components by curing during the pressing step (column 2, lines 49 to column 3, line 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture the bipolar graphite article as shown in Dettling et al., Chi and/or van Ommering and Mercuri '728 by curing the resin impregnated graphite component during the pressing step in order to reduce the number of manufacturing steps and as is known in the art and exemplified by Selover when bonding two graphite components.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dettling et al. in view of Chi and/or van Ommering and Mercuri '728 as applied to the claims above, and further in view of Edgington et al. (US Patent No. 5,589,301).

As discussed above, Dettling discloses manufacturing a graphite bipolar article by forming two graphite components and then pressing the components in order to assemble the plates together and bonding the components to form the bipolar article. As discussed above, it would have been obvious to provide a corresponding protrusion and recess in the components as is well known and exemplified by Chi and/or van Ommering in order to provide an improved seal. Also, as discussed above, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the graphite components from known methods as shown by Mercuri '728.

As to claim 10, Mercuri '728 discloses providing sheets of compressed mass of expanded graphite particles for the graphite components (column 4, lines 54-55), then impregnating the sheet with a resin to form uncured resin impregnated sheets (column 4, lines 55-58), then embossing (mechanically stamping into a shape) to from the sheet components, and curing the resin in the components (column 5, lines 1-3).

Mercuri '728 discloses that the preferred method is to calender the resin containing sheet by roll pressing (column 3, lines 36-38), however does not explicitly state that the resin impregnated sheet is calendered prior to the embossing step. It is known to calender impregnated webs in order to properly impregnate the web and to achieve the desired thickness of the web prior to further processing. For example, Edgington discloses a method of impregnating a web where the web is calendered

between rollers 17 in order to impregnate the web and to achieve a uniform thickness prior to further processing steps (column 5, lines 44-60). It would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture the bipolar article as shown by Dettling, Chi and/or van Ommering and Mercuri '728, by calendering the resin impregnated graphite sheet prior to embossing as is well known and exemplified by Edgington in order to provide uniform thickness and to properly impregnate the web prior to further processing.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dettling et al. in view of Chi and/or van Ommering and Mercuri '728, further in view of Edgington et al. as applied to claim 10 above, and further in view of Selover, Jr. et al. (US Patent No. 4,014,730).

Claim 10 currently does not distinctly claim that the curing step bonds the components together, however it is well known to bond two uncured resin impregnated composites by pressing, curing and bonding in the same step. Mercuri '728 discloses the graphite material is resin impregnated and uncured at the step of forming and then curing occurs at a later heating step. Dettling discloses heating the graphite components during the pressing step to assemble the components together. It would have been obvious to one of ordinary skill in the art at the time of the invention to cure the components during the pressing step in order to reduce the number of manufacturing steps. Only the expected results would be attained. This is particularly true in view of Selover, which discloses it is known to bond two resin impregnated graphite components by curing during the pressing step (column 2, lines 49 to column

3, line 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture the bipolar graphite article as shown in Dettling et al., Chi and/or van Ommering and Mercuri '728 by curing the resin impregnated graphite component during the pressing step in order to reduce the number of manufacturing steps and as is known in the art and exemplified by Selover when bonding two graphite components.

8. Claims 2-7, 9-20 are rejected under 35 U.S.C. 103(a) as being obvious over Dettling et al. in view of Chi and/or van Ommering et al. as applied to claims 1 and 8 above, and further in view Mercuri '336 et al. (US Patent No. 6,432,336).

The applied reference Mercuri '336 has a common Inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the

reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Dettling discloses forming a graphite bipolar article by forming two components and bonding the components together during pressing. However, Dettling does not specifically disclose the method steps of forming the graphite components, only reciting that the plates are molded or extruded from graphite particles (column 8, lines 29-43). Mercuri '336 discloses known methods of forming graphite component plates for flow field plates in fuel cells. It would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture the bipolar graphite article as shown in Dettling, Chi and/or van Ommering by forming the graphite components by known methods in the art as shown by Mercuri '336 in order to provide graphite components with increased sealability and increased strength (column 3, lines 6-14).

As to claims 2, 11 and 19, Mercuri '336 discloses that it is known to form the graphite material plates by embossing (mechanically deformed by embossing) a sheet of resin-impregnated graphite material (column 9, lines 43-46). As to claim 3, the sheet was uncured at the forming step (column 9, lines 43-47). As to claim 4, the resin impregnated graphite material is cured (column 9, lines 46-47). As to claim 5, Mercuri '336 discloses compressing the resin impregnated graphite material (column 9, lines 39-40). As to claim 6, the resin impregnated graphite material is uncured at the forming step (column 9, lines 43-47). As to claim 7, the resin impregnated graphite material is cured (column 9, lines 46-47). As to claim 9, Mercuri '336 discloses the graphite

material is resin impregnated and uncured at the step of forming and then curing occurs at a later heating step. Dettling discloses heating the graphite components during the pressing step to assemble the components together. It would have been obvious to one of ordinary skill in the art at the time of the invention to cure the components during the pressing step in order to reduce the number of manufacturing steps. Only the expected results would be attained. As to claim 10, Mercuri '336 discloses providing sheets of compressed mass of expanded graphite particles for the graphite components (column 9, lines 19-33), then impregnating the sheet with a resin to form uncured resin impregnated sheets (column 9, lines 34-38), then the uncured resin impregnated sheet is calendered (column 9, lines 39-44), then embossing to from the sheet components (column 9, lines 43-45), and curing the resin in the components (column 9, lines 46-47). As to claim 11, Dettling discloses heating after assembling (hot pressing; column 4, lines 15-25). As to claim 12, the components in Dettling are formed of flexible graphite sheets (as are conventional due to their relatively thin layers) and Mercuri '336 discloses forming flexible graphite sheets (column 1, line 11). As to claim 13, the claimed ranges of resin are within the conventional ranges, and it would have been well within the purview of one of ordinary skill in the art to provide such ranges, only the expected results would be attained. As to claim 14, it would have been well within the purview of one of ordinary skill in the art to provide the plates with the same composition and content of resin, only the expected results would be attained. As to claims 15 and 16, as discussed above, it would have been obvious to provide a protrusion and a recess in the sheets as obvious over well known bonding techniques as exemplified by

Chi and/or Van Ommering. As to claim 17, Mercuri '336 discloses the claimed density of the graphite sheet (column 7, lines 53-55). Furthermore, the claimed density ranges are within the conventional ranges for graphite sheets and it would have been well within the purview of one of ordinary skill in the art to provide sheets with conventional densities, only the expected results would be attained. As to claim 18, it would have been well within the purview of one of ordinary skill in the art to provide the plates with the same density, only the expected results would be attained. As to claim 19, Dettling discloses bonding the components after assembling (column 4, lines 15-25). As to claim 20, Dettling bonds the components by heating up the bipolar graphite article (column 4, lines 15-25).

9. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dettling et al. in view of Chi and/or van Ommering and Mercuri '336 as applied to claim 10 above, and further in view of Selover, Jr. et al. (US Patent No. 4,014,730).

It is noted that Claim 10 currently does not distinctly claim that the curing step bonds the components together.

It is well known to bond two uncured resin impregnated composites by pressing, curing and bonding in the same step. Mercuri '336 discloses the graphite material is resin impregnated and uncured at the step of forming and then curing occurs at a later heating step. Dettling discloses heating the graphite components during the pressing step to assemble the components together. It would have been obvious to one of ordinary skill in the art at the time of the invention to cure the components during the pressing step in order to reduce the number of manufacturing steps. Only the expected

results would be attained. This is particularly true in view of Selover, which discloses it is known to bond two resin impregnated graphite components by curing during the pressing step (column 2, lines 49 to column 3, line 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture the bipolar graphite article as shown in Dettling et al., Chi and/or van Ommering and Mercuri '336 by curing the resin impregnated graphite component during the pressing step in order to reduce the number of manufacturing steps and as is known in the art and exemplified by Selover when bonding two graphite components.

Response to Arguments

10. Applicant's arguments filed March 4, 2003 have been fully considered but they are not persuasive.

Applicant argues on page 4 that a cited passage in Dettling does not provide motivation on how to form a joint between two plates but rather to make a flow field plate more fluid impermeable. Applicant further argues on page 4 that neither the van Ommering reference nor the Chi reference provide motivation to modify the teaching in Dettling. Dettling does discloses the importance of a tight seal in between the two components. Furthermore it is well known in the binding arts when bonding two substrates together to provide a protrusion in one substrate and a recess in the other substrate in order to form a stronger, interlocking bond. The motivation is found in the desire of one of ordinary skill in the art to form a stronger bond. Furthermore, the references Chi and/or van Ommering both disclose the desire to form stronger bonds between plates in fuel cells by providing a protrusion in one plate and a recess in

another plate. For example, Chi discloses that the sealing of the interfaces of plates in a fuel cell (including bipolar plates) can be further facilitated by providing the plates with male and female joints in their flat facing surfaces (column 3, lines 43-46). Van Ommering also discloses the frames to stacked bipolar plates are provided with a tongue and a groove in order to provide the important property of positive sealing (column 6, lines 29-49). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the components in the method of manufacturing a bipolar graphite article as shown in Dettling with a protrusion and a corresponding recess in order to form a better seal between the components as is well known in the bonding arts in general and as particularly known in the field of forming fuel cells as exemplified by Chi and/or van Ommering.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gladys J Piazza Corcoran whose telephone number is (703) 305-1271. The examiner can normally be reached on M-F 8am-5:30pm (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Ball can be reached on (703) 308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gladys JP Corcoran
May 16, 2003

JEFF H. AFTERGUT
PRIMARY EXAMINER
GROUP 1300